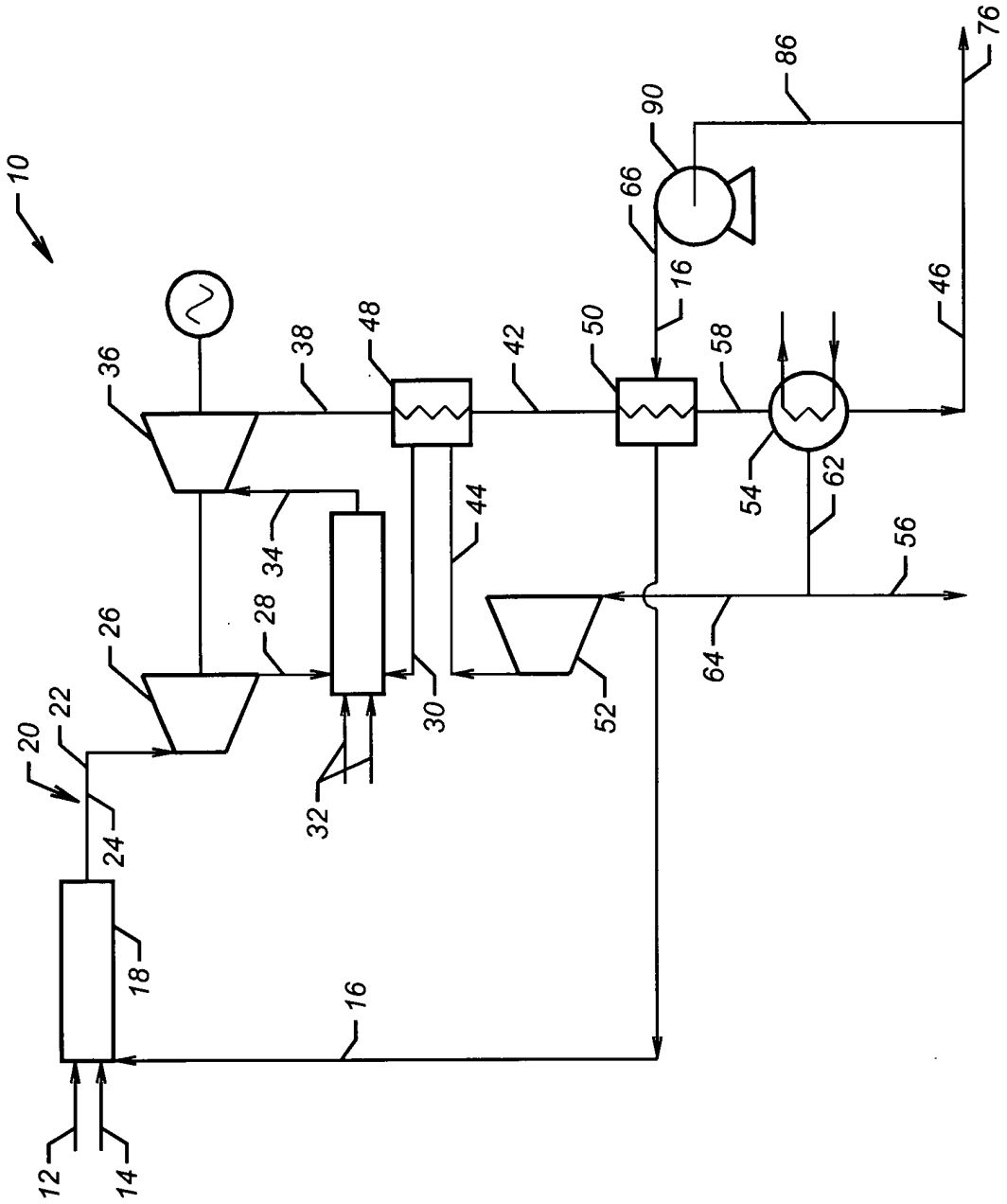

FIG. 1

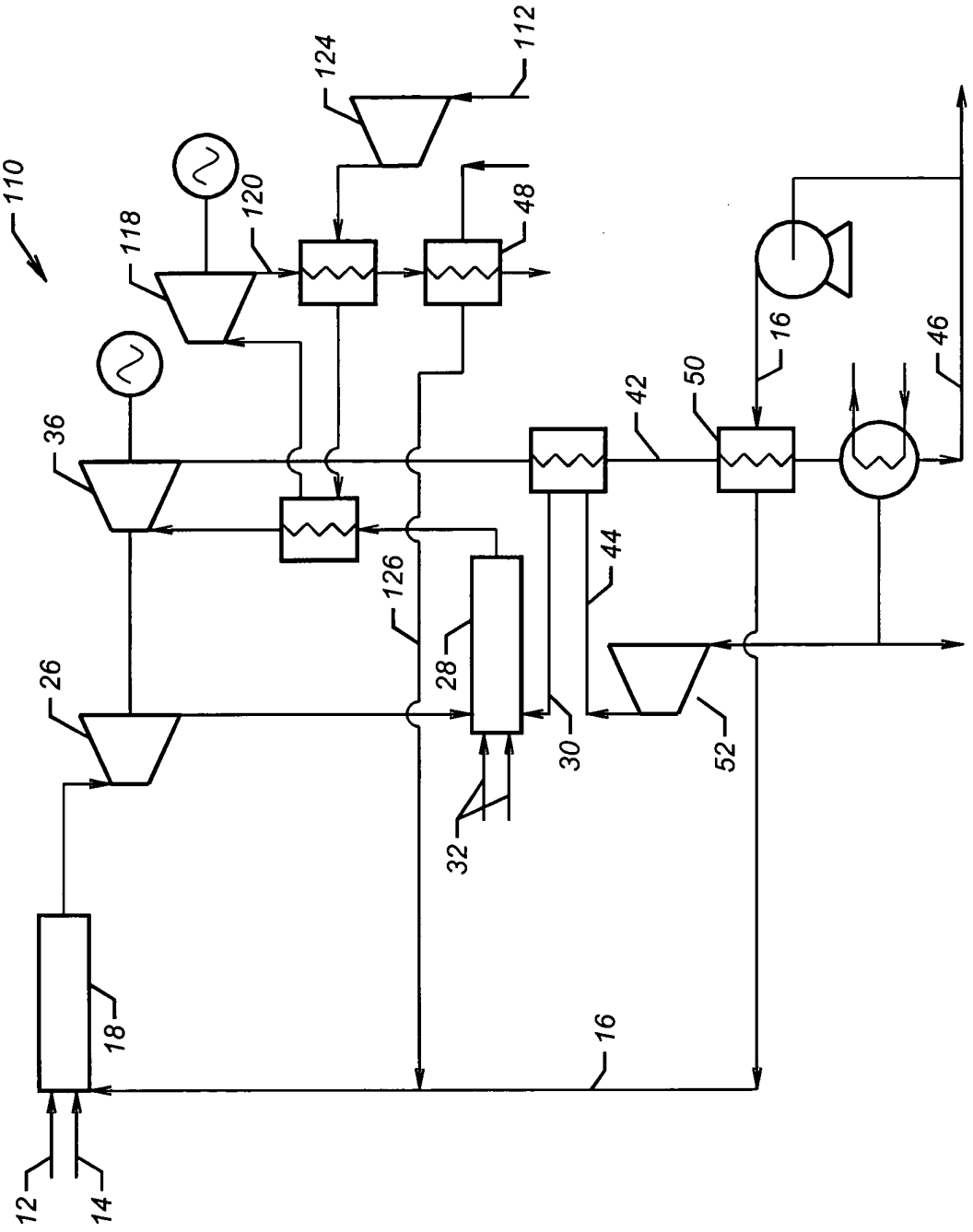
110
112
124
120
118
48
36
42
50
16
46
44
126
28
26
30
52
32
18
16
12
14

FIG. 2

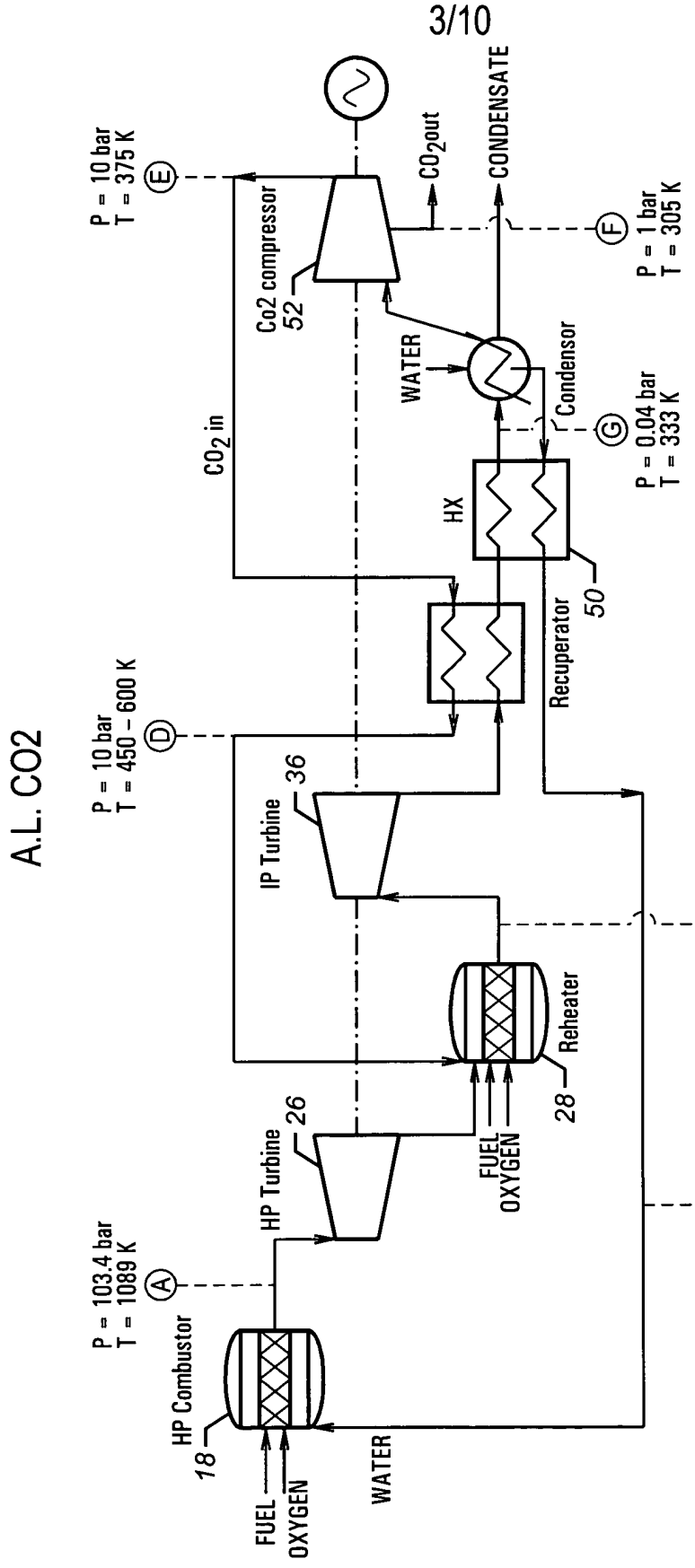
A.L. CO2
P = 103.4 bar
T = 1089 K
A
HP Combustor
18
FUEL
OXYGEN
WATER
HP Turbine
26
P = 114.8 bar
T = 550 – 594 K
B
FUEL
OXYGEN
28
Reheater
P = 9 bar
T = 1477 K
T = 1699 K
T = 1922 K
C
IP Turbine
36
P = 10 bar
T = 450 – 600 K
D
Recuperator
50
HX
Condensor
G
P = 0.04 bar
T = 333 K
WATER
Co2 compressor
52
P = 10 bar
T = 375 K
E
CO2 in
CO2out
CONDENSATE
F
P = 1 bar
T = 305 K

FIG. 3

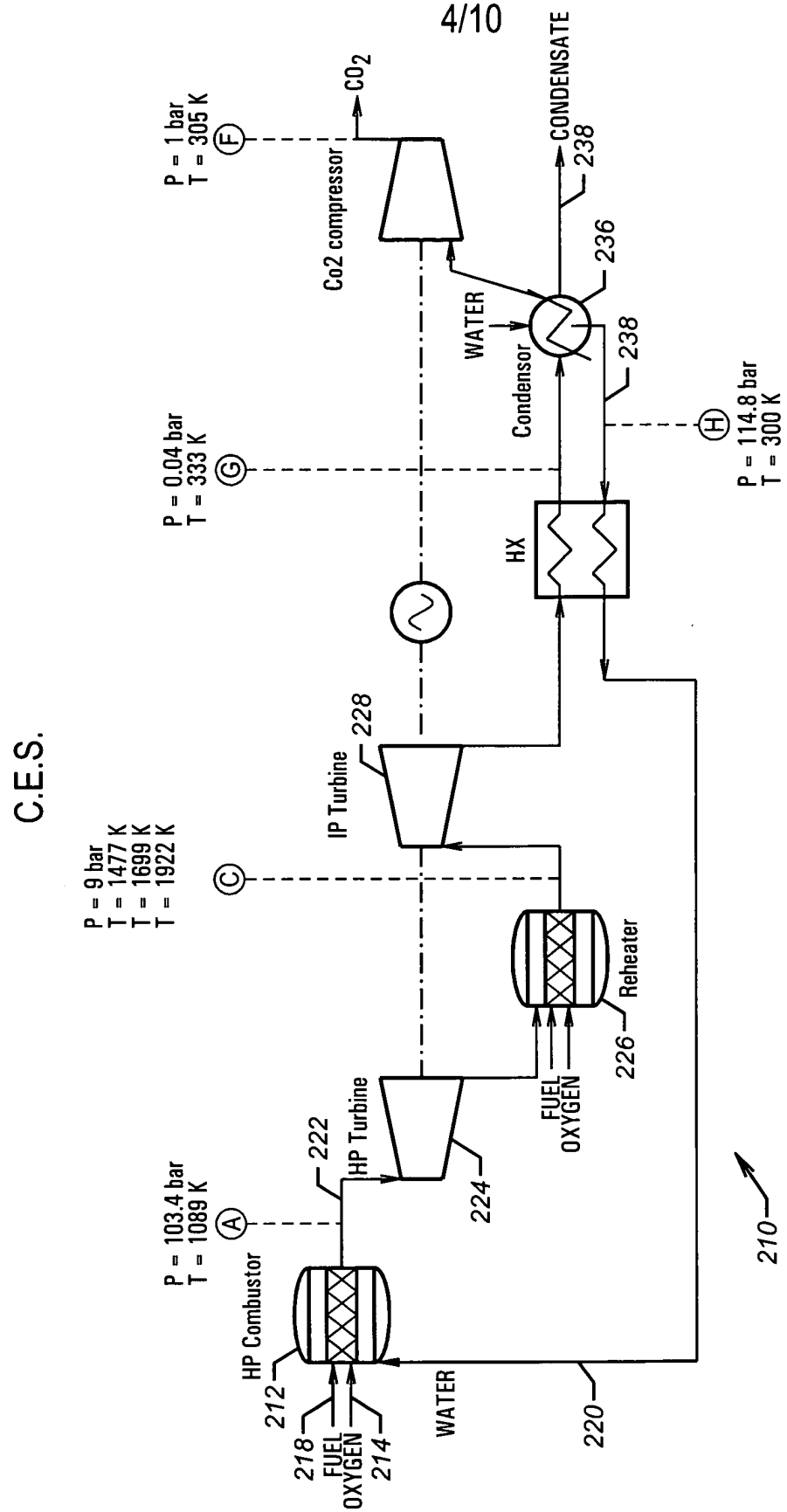
C.E.S.
P = 103.4 bar
T = 1089 K
A
HP Combustor
212
218
FUEL
OXYGEN
214
WATER
220
222
HP Turbine
224
FUEL
OXYGEN
226
Reheater
P = 9 bar
T = 1477 K
T = 1699 K
T = 1922 K
C
IP Turbine
228
P = 0.04 bar
T = 333 K
G
HX
Condensor
WATER
236
238
238
CONDENSATE
Co2 compressor
CO_2
P = 1 bar
T = 305 K
F
P = 114.8 bar
T = 300 K
H
210

FIG. 4

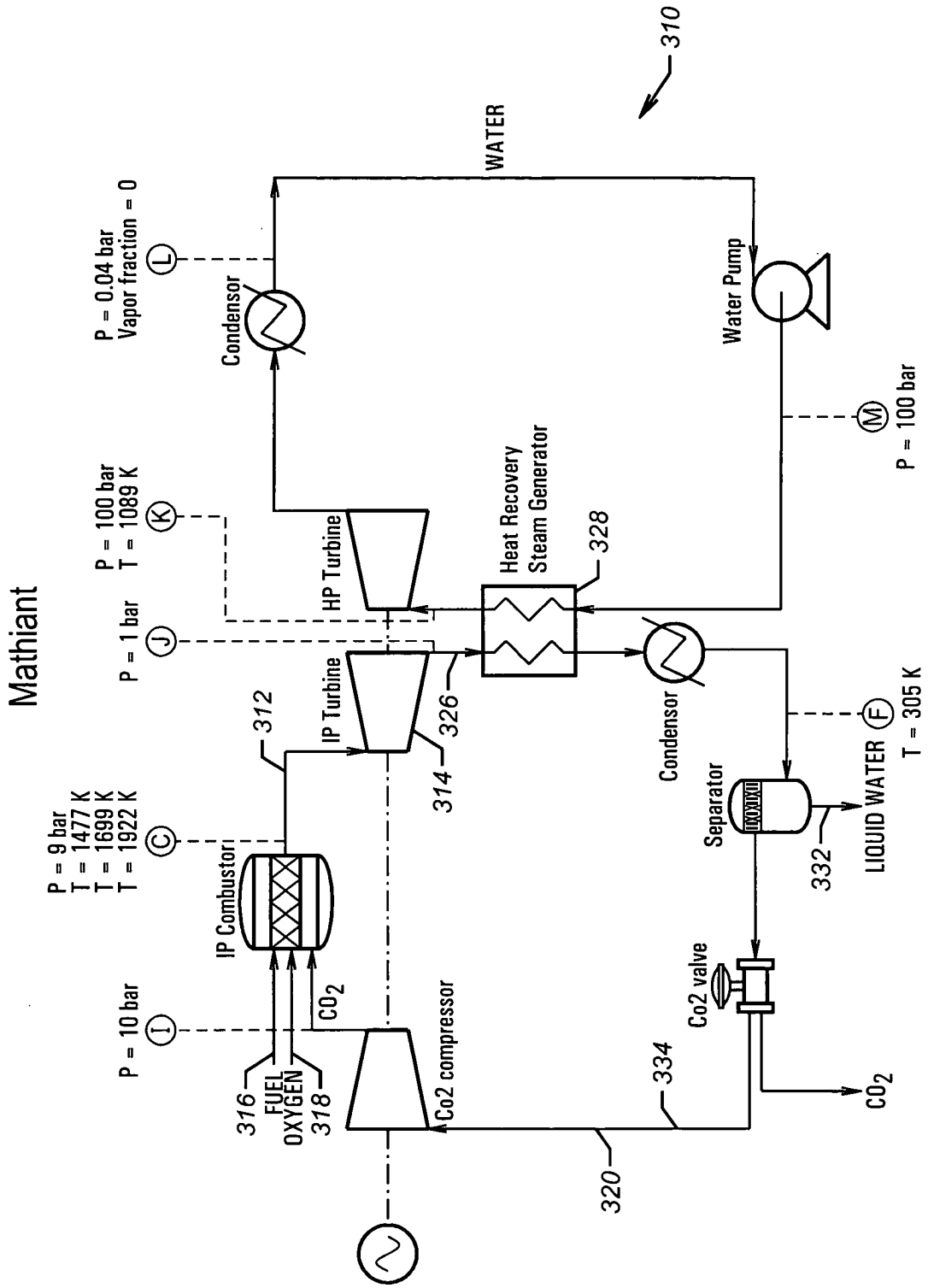
Mathiant
310
WATER
P = 0.04 bar
Vapor fraction = 0
L
Condensor
Water Pump
M
P = 100 bar
P = 100 bar
T = 1089 K
K
HP Turbine
Heat Recovery
Steam Generator
328
P = 1 bar
J
IP Turbine
326
312
314
Condensor
F
T = 305 K
LIQUID WATER
Separator
332
P = 9 bar
T = 1477 K
T = 1699 K
T = 1922 K
C
IP Combustor
Co2 valve
P = 10 bar
I
CO_2
316
FUEL
OXYGEN
318
Co2 compressor
334
CO_2
320

FIG. 5

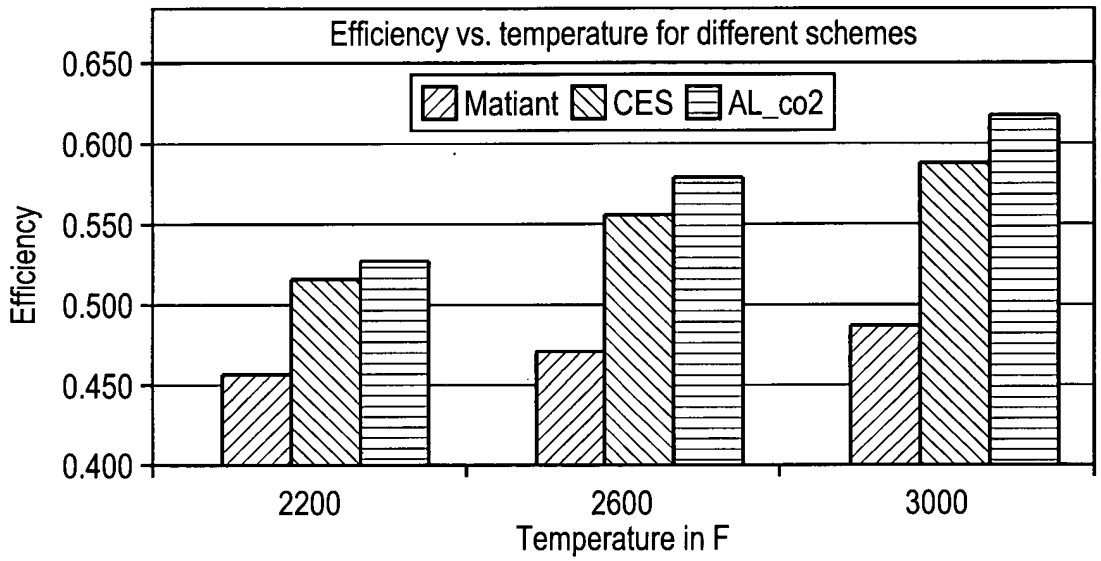
Efficiency vs. temperature for different schemes
Matiant
CES
AL_co2
0.650
0.600
0.550
0.500
0.450
0.400
Efficiency
2200
2600
3000
Temperature in F

FIG. 6

Fuel	CH4
Temperature inlet	293 K
Pressure inlet	12.41 bar
Oxidant	02
Temperature inlet	293 K
Pressure inlet	27.58 bar
Fuel 2	CH4
Temperature inlet	293 K
Pressure inlet	10 bar
Oxidant	02
Temperature inlet	293 K
Pressure inlet	10 bar
o2 & ch4 (HP) (IP) Mcompressors	
number of stage	4
method	polytropic
discharge pressure	(114.8) (10) bar
efficiency	0.8
intercooling	90 F each stg expt last
Pressure drop	0 psi

HP combustor	
Pressure outlet	103.4 bar
Pressure drop	10%
reaction	complete
Q loss	0=adiabatic
Turb1=Steam turbine HP	
method	isentropic
discharge pressure	10 bar
efficiency	0.9
Inlet temperature	1089 K
Reheater IP	
Pressure outlet	9 bar
Pressure drop	10%
reaction	complete
Q loss	0=adiabatic
Turb2=Gas turbine IP	
method	isentropic
discharge pressure	0.04 bar
isentropic efficiency	0.93
Inlet temperature	2200 2600 3000 F

***TABLE 7**--Water Recycle*

Gas turbine side

Fuel	CH4
Temperature inlet	293 K
Pressure inlet	10 bar
Oxidant	02
Temperature inlet	293 K
Pressure inlet	10 bar
IP combustor	
Pressure outlet	9 bar
pressure drop	10%
reaction	complete
Q loss	0 W adiabatic
Gas turbine	
method	isentropic
discharge pressure	1 bar
efficiency	0.93
Inlet temperature	2200 2600 3000
HRSG	
hot stream outlet	140 F
Pressure drop	not taken into account
Condensor 1	
hot stream outlet	100 F
Pressure drop	not taken into account
(Co2) Mcompressor	
number of stage	4
method	polytropic
discharge pressure	10 bar
efficiency	0.8
intercooling	90 F each stg expt last
Pressure drop	not taken into account
Water pump	
discharge pressure	2 bar
efficiency	0.75
Water	
Temperature inlet	293 K
Pressure inlet	1 bar

Steam turbine side

Steam turbine	
method	isentropic
discharge pressure	0.04bar
efficiency	0.9
Inlet temperature	1089 K
Condensor 2	
hot stream outlet	vap frac=0
Pressure drop	not taken into account
Separator 1	
temperature	305 K
pressure	1 bar
Liquid entrainment	0
Water pump	
discharge pressure	2 bar
efficiency	0.75
Water	
Temperature inlet	293 K
Pressure inlet	1 bar
Circulation pump	
discharge pressure	100 bar
efficiency	0.75

TABLE 8--*CO_2 Recycle*

Fuel	CH4
Temperature inlet	293 K
Pressure inlet	12.41 bar
Oxidant	02
Temperature inlet	293 K
Pressure inlet	27.58 bar
Fuel 2	CH4
Temperature inlet	293 K
Pressure inlet	10 bar
Oxidant	02
Temperature inlet	293 K
Pressure inlet	10 bar
o2 & ch4 (HP) (IP) Mcompressors	
number of stage	4
method	polytropic
discharge pressure	(114.8) (10) bar
efficiency	0.8
intercooling	90 F each stg expt last
Pressure drop	0 psi
(Co2) Mcompressor	
number of stage	3
method	polytropic
discharge pressure	10 bar
isentropic efficiency	0.8
intercooling	90 F each stg expt last
Pressure drop	0 psi

HP combustor	
Pressure outlet	103.4 bar
Pressure drop	10%
reaction	complete
Q loss	0=adiabatic
Turb1=Steam turbine HP	
method	isentropic
discharge pressure	10 bar
efficiency	0.9
Inlet temperature	1089 K
Reheater IP	
Pressure outlet	9 bar
Pressure drop	10%
reaction	complete
Q loss	0=adiabatic
Turb2=Gas turbine IP	
method	isentropic
discharge pressure	0.04 bar
isentropic efficiency	0.93
Inlet temperature	2200 2600 3000 F

Vacuum 'pump' (Mcompressor)	
number of stage	4
method	polytropic
discharge pressure	10 bar
isentropic efficiency	0.8
intercooling	90 F each stage
Pressure drop	0 psi
HeatX 1 = Condensor	
hot stream outlet	333 K
Pressure drop	not taken into account
HeatX B1 = recuperator	
hot stream outlet	605 K
Pressure drop	not taken into account
Air cooler	
hot stream outlet	295 K
Pressure	0.04 bar
Pressure drop	not taken into account
co2 reheater	
hot stream outlet	326.6 K
Pressure drop	not taken into account
Water pump	pump
discharge pressure	114.8 bar
efficiency	0.75
Wout pump	pump
discharge pressure	1 bar
efficiency	0.75
Water	
Temperature inlet	293 K
Pressure inlet	1 bar

***TABLE 9**--Preferred Embodiment*

Type of cycle	T HP	T IP	Final Pressure	M.F. CO2	M.F. CO2	Eff	Eff
	F	F	Bar	flue gas	recycled	without seq	with seq
matiant	1500	2200	1 & 0.04	0.930	0.916	0.456	0.438
matiant	1500	2600	1 & 0.04	0.914	0.893	0.471	0.452
matiant	1500	3000	1 & 0.04	0.868	0.897	0.487	0.468
CES	1500	2200	0.04	0.222	0.000	0.516	0.498
CES	1500	2600	0.04	0.234	0.000	0.556	0.537
CES	1500	3000	0.04	0.246	0.000	0.588	0.570
CO2 case2	1500	2200	0.04	0.805	0.890	0.527	509
CO2 case2	1500	2600	0.04	0.800	0.876	0.579	0.560
CO2 case2	1500	3000	0.04	0.785	0.856	0.618	0.599

***TABLE 10**--Comparison*